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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/551,645

09/29/2005

Koki Otsuka

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EXAMINER

WILSON, AARON NOEL

ART UNIT

PAPER NUMBER

3747

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

04/24/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/551,645

Applicant(s)

OTSUKA ET AL.

Examiner

Aaron N. Wilson

Art Unit

3747

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9/29/2005; 5/25/2006</u> .                                    | 6) <input type="checkbox"/> Other: ____.                          |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

2. Claims 1-4 are rejected under 35 U.S.C. 102(e) as being anticipated by Zhu et al. (US 2006/0037471). In regard to claim 1, Zhu teaches an integrally cast steel piston for internal engines [0013]. In regard to claim 2, Zhu teaches the internal engine piston according to claim 1, whose head portion, pin boss portion and skirt portion are integrally cast [0013]. In regard to claim 3, Zhu teaches the internal engine piston according to claim 2, wherein it further comprises a cooling hollow portion (28), which is formed by integral casting [0015]. In regard to claim 4, Zhu teaches the internal engine piston according to claim 3, wherein it is a diesel engine piston comprising a combustion chamber (16) in a head portion, and wherein it further comprises a cooling hollow portion, which is formed near said combustion chamber by integral casting [0002].

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 5-9 and 11-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lopez (US 2005/0076975 A1). In regard to claim 5, Lopez teaches an integrally cast steel piston for internal engines, said cast steel having a composition comprising, by mass, 0.8% or less of C, 3% or less of Si, 3% or less of Mn, 0.2% or less of S, 3% or less of Ni, 6% or less of Cr, 6% or less of Cu, and 0.01-3% of Nb, the balance being substantially Fe and inevitable impurities.

In regard to claim 6, Lopez teaches the internal engine piston according to claim 5, wherein said cast steel has a composition comprising, by mass, 0.1-0.55% of C, 0.2-2% of Si, 0.3-3% of Mn, more than 0.005% and 0.2% or less of S, 1% or less of Ni, 3% or less of Cr, 1-4% of Cu, and 0.1-3% of Nb, the balance being substantially Fe and inevitable impurities, but some of the ranges of composition that Lopez teaches go beyond the ranges mentions in claim 6 [claim 24]. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable there

over because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.). Variations in concentration are a matter of optimization and generally not patentable. In regard to claim 7, Lopez teaches an integrally cast steel piston for internal engines, said cast steel having a composition comprising, by mass, 0.1-0.8% of C, 3% or less of Si, 3% or less of Mn, 0.2% or less of S, 10% or less of Ni, 30% or less of Cr, 6% or less of Cu, and 0.05-8% of Nb, the balance being substantially Fe and inevitable impurities, but some of the ranges of composition that Lopez teaches go beyond the ranges mentions in claim 6 [claim 24]. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. Variations in concentration are a matter of optimization and generally not patentable. In regard to claim 8, Lopez teaches the internal engine piston according to claim 7, wherein said cast steel has a composition comprising, by mass, 0.1-0.55% of C, 0.2-2% of Si, 0.3-3% of Mn, 0.05-0.2% of S, 0.5-6% of Ni, 6-20% of Cr, 1-4% of Cu, and 0.2-5% of Nb, the balance being substantially Fe and inevitable impurities, but some of the ranges of composition that Lopez teaches go beyond the ranges mentions in claim 6 [claim 24]. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. Variations in concentration are a matter of optimization and generally not patentable. In regard to claim 9, Lopez teaches the internal engine piston according to claim 7, wherein said cast steel comprises C, Ni and

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Nb in a range of 0.05 (C% + 0.15 Ni% - 0.12 Nb%) 0.8 by mass, but some of the ranges of composition that Lopez teaches go beyond the ranges mentions in claim 6 [claim 24]. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. Variations in concentration are a matter of optimization and generally not patentable. In regard to claim 11, Lopez teaches the internal engine piston according to claim 5, wherein said cast steel further comprises 0.5% by mass or less of V and/or Ti. In regard to claim 12, Lopez teaches the internal engine piston according to claim 5, wherein said cast steel further comprises at least one of Al, Mg and Ca in an amount of 0.04% by mass or less, but the range of composition that Lopez teaches goes beyond the ranges mentions in claim 6 [claim 24]. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. Variations in concentration are a matter of optimization and generally not patentable. In regard to claim 13, Lopez teaches an integrally cast steel piston for internal engines, said cast steel having a microstructure having eutectic carbides at an area ratio of 1-35%, said eutectic carbides forming eutectic colonies, which are assemblies of eutectic carbides and said matrix phase.

Page 4, lines 10 to 13 in applicant's specifications states "It is described that V and Nb make crystal grains finer to improve toughness, form carbides to improve wear resistance and seizure resistance, and improve temper-softening resistance." It is known that a steel alloy, having the composition stated in the specifications, will yield

these physical characteristics [claim 24]. In regard to claim 14, Lopez teaches the internal engine piston according to claim 13, wherein said eutectic carbides have an average equivalent-circle diameter of 3  $\mu\text{m}$  or less. It is known that a steel alloy, having the composition stated in the specifications, will yield these physical characteristics. In regard to claim 15, Lopez teaches the internal engine piston according to claim 13, wherein the number of eutectic colonies each having an area of 50  $\mu\text{m}^2$  or more is 10 or more in a 1mm<sup>2</sup> cross section of the microstructure. It is known that a steel alloy, having the composition stated in the specifications, will yield these physical characteristics. In regard to claim 16, Lopez teaches the internal engine piston according to claim 13, wherein said eutectic carbides include Nb carbides. "It is described that V and Nb make crystal grains finer to improve toughness, form carbides to improve wear resistance and seizure resistance, and improve temper-softening resistance." It is known that a steel alloy, having the composition stated in the specifications, will yield these physical characteristics. In regard to claim 17, Lopez teaches an integrally cast steel piston for internal engines, wherein an area ratio of sulfides is 0.2-3.0% in a cast steel microstructure, and wherein a ratio of the number of sulfides each having a circularity of 0.7 or more to the total number of sulfides is 70% or more. On page 16 in applicant's specifications, between lines 20 and 27, the applicant states "S has functions of forming sulfides with Mn and Cr for improving thermal cracking resistance, and S-containing inclusions for improving the machinability of the cast steel." Lopez teaches cast steel that contains S, Mn and Cr, therefore the steel in all likelihood contain sulfides [0024]. The range of composition that Lopez teaches goes

beyond the ranges mentions in claim 6 [claim 24]. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. Variations in concentration are a matter of optimization and generally not patentable. In regard to claim 18, Lopez teaches the internal engine piston according to claim 17, wherein said sulfide contains Mn and/or Cr [claim 24]. In regard to claim 19, Lopez teaches the internal engine piston according to claim 5 wherein said cast steel has a 0.2-% yield strength of 350 MPa or more and a Young's modulus of 140 GPa or more in a range of 350°C to 500°C, and an average linear thermal expansion coefficient of  $10-16 \times 10^{-6}/^{\circ}\text{C}$  between room temperature and 500°C. It is inherent that a steel alloy, having the composition stated in claim 5, will yield these physical characteristics. In regard to claim 20, Lopez teaches a method for producing an integrally cast steel piston for internal engines, said cast steel having a composition comprising, by mass, 0.8% or less of C, 3% or less of Si, 3% or less of Mn, 0.2% or less of S, 3% or less of Ni, 6% or less of Cr, 6% or less of Cu, and 0.01~3% of Nb, the balance being substantially Fe and inevitable impurities, said method comprising casting said steel, holding it at 850°C or higher, and then air-cooling it [Detailed Description]. In regard to claim 21, Lopez teaches the method for producing an internal engine piston according to claim 20, wherein said cast steel is cast, held at 450°C or higher, and then air-cooled. It is inherent that a steel alloy, having the composition stated in claim 5, will yield these physical characteristics. In regard to claim 22, Lopez teaches the method for producing an internal engine piston according to claim 21,



wherein said cast steel is field at 1000°C or higher after casting, rapidly cooled, held at 450°C or higher, and then air-cooled. It is inherent that a steel alloy, having the composition stated in claim 5, will yield these physical characteristics.

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lopez in view of Schade. In regard to claim 10, Lopez teaches the internal engine piston according to claim 7, but does not teach wherein said cast steel has a matrix microstructure, less than 30% of which is an austenite phase. Schade teaches said cast steel has a matrix microstructure, less than 30% of which is an austenite phase (Figure 2a) [0072].

### ***Conclusion***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Each prior art comprises alloy steel.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron N. Wilson whose telephone number is (571)272-3319. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Cronin can be reached on (571)272-4536. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Art Unit 3747

anw

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